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ABSTRACT

This paper, which is intended for individuals responsible for information management at British further education (FE) colleges, describes the attempts by a number of FE institutions to manage their information effectively and provides guidelines for FE institutions to follow when developing their own information management strategy. After a brief discussion of the term "management information system," the development of computerized management information systems in FE colleges is traced. Examined in the next two sections are considerations in formulating an information strategy for the purpose of developing an integrated approach to managing/supporting the learning process within an institution and factors to consider when conducting an information technology needs analysis. The following practical steps in drafting a total information strategy are reviewed: assign a development leader; set up a strategy group; analyze users' requirements; create an initial user specification; decide on the systems' functions; identify curriculum information technology needs; analyze the college's existing communication systems; identify hardware requirements; decide on training needs; set up information technology development groups; create a resourcing strategy; relaunch the college information service; and set up a user group. Concluding the paper are comments on strategy development and implementation plans. (MN)

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CONTENTS

STARTING POINTS 1

HISTORIC PERSPECTIVE 2

PURPOSES OF AN INFORMATION STRATEGY 3

NEEDS ANALYSIS 3

PRACTICAL STEPS 4

STRATEGY DEVELOPMENT 7

IMPLEMENTATION PLAN 7

CONCLUSIONS 8

REFERENCES 8

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Information systems: a strategic approach

Starting points

The information and information system strategies adopted by a college should be unique to itself. They should be the product of that particular college's vision and the technologies it already has and plans to install in the future. There is no general solution or model that can be applied across the further education (FE) sector.

This paper incorporates the experiences of a number of further education institutions, and their individual attempts to manage information effectively. Together, these experiences offer an insight into a range of approaches which could be taken to ensure that an institution achieves its strategic plan. Some of the ideas expressed could help to shape and inform the way in which your institution's strategies are developed, but they will not offer a neatly-packaged complete solution.

In many colleges the term Management Information System (MIS) is a misnomer. The term implies an integrated system which produces all the information required by college management. In most cases such a system does not exist.

Increasing demands on managers, primarily from funding councils and government agencies, have forced all colleges to re-assess their use and management of information. The ability to account for public sector finance and to act with probity is paramount to a college's existence. Also, none would dispute the importance of accuracy and timeliness in the production of information and the ability to act upon it. Yet some have come to the conclusion that trying to meet all of the demands, with their consequent pressures on the college, have made the whole exercise futile and that they will have to be selective in their responses, and focus on those aspects needed to meet the funding and government requirements.

The use of MIS to manage information has hence been translated into a number of management functions, including:

- tracking students
- accounting for resources at cost centre and institutional level
- managing the college efficiently and effectively

However, the concept of information management goes well beyond this: colleges have to ensure that they take steps to manage the learning process for their students. Increasingly, as students have more control over their learning programme they will be managing this process themselves. This may only be achieved by taking a holistic approach to the management of the total information technology resource within a total information strategy. Many colleges need to pause, step back and re-assess, before yet more finance is thrown at hardware and software in the vain hope that this will solve the MIS problem.

Historic perspective

During the late 1980s and early 1990s something like £36 million was invested in computerised management information systems (CMIS) in colleges through Educational Support Grants (ESGs). Each local education authority (LEA) took an individual approach to the way in which it developed and subsequently implemented a strategy and allocated funding for these systems. Although there was successful implementation of some aspects, in others it was characterised by one of a number of flawed approaches to the delivery of the systems. These include:

- highly centralised approach, which did not take into account individual college requirements or the current stage of development
- decentralised approach, which was not supported by adequate technical assistance or training at operational or strategic level
- limited consultation at the decision-making stages, which resulted in a lack of ownership by colleges, especially at senior management level
- a tendency for a small number of enthusiasts, working together within individual colleges, to be driven by hardware and software requirements rather than college information requirements
- an emphasis just on the administrative systems
- little or no consideration of the information needs of prospective users or of defining these needs in systems terms
- little consideration of curriculum needs for effective management of the learning process
- a random use of computerised, stand-alone and non-computerised systems, often being used for the same functions and producing different results

Even some five years on and three years after incorporation, many of these approaches can still be seen in colleges.

The evolution of management information systems features the following characteristics:

- involves a reactive approach
- is based upon information which is specific to pressing demands
- is usually externally driven
- incorporates a variety of hardware and software platforms which were not centrally co-ordinated

This latter characteristic has been significant in determining the position in which many colleges now find themselves: one of data handling rather than producing information on which to base sound management decisions.

The publication of the Higginson report, *Report of the Learning and Technology Committee*, has again put information processing high on the further education agenda, with its long-overdue emphasis on information and learning technologies (ILT). However, it falls short of defining how many of the information issues need to be addressed to support the delivery of ILT, except by identifying a significant need for staff development.

Purposes of an information strategy

The purpose of establishing an information strategy is to develop an integrated and co-ordinated approach to the management and support of the learning process within an institution. The management of the learning process will incorporate all the activities, direct or indirect, which contribute to the experiences of a student, customer or client of the college. Recently, there has been an emphasis on the tracking of students, which although a prime and key activity in the management of the learning process, is only one element. The information strategy must define the information requirements of the organisation first and foremost. Only then should the information systems and information technology strategies required to ensure the effective provision of this information be specified.

The information strategy should be designed to meet the following objectives:

- to define the information requirements of the organisation at all levels
- to create a culture in which good information is disseminated to allow the organisation to function effectively and efficiently
- to provide a model for organisations with whom the college works

The information systems and information technology strategies adopted should:

- define the use of information and learning technologies within the college curriculum
- state the IT use required to support the management decision-making
- ensure that administrative systems are adequate to meet external requirements for information
- define the processes by which the information is collected, collated, analysed and disseminated
- establish an implementation agenda, which includes timescales for developing integrated and/or interfacing systems which meet all defined needs
- identify the resources required to effectively meet the information needs of the college, emphasising, but not exclusively focusing on, technological solutions, and to create an agenda for achieving this
- define the training and development requirements of all users, actual and prospective, and to establish an implementation agenda to meet these needs

If a college incorporates all of the above objectives and links its information strategy to its overall strategic plan, it should be left with a strategy which is capable of meeting the information needs of all staff, students, governors and external agencies.

Needs analysis

Before a college can develop a comprehensive information strategy, it needs to establish its current position in respect to the:

- information implications of its strategic plan
- numbers and type of users of IT in the curriculum

- numbers and types of users of information for decision- making purposes
- accessibility of its information in terms of physical access and user-friendliness of systems
- level of integration and functionality of the system
- appropriateness and functionality of its databases
- quality of its information in terms of accuracy, reliability and timeliness
- specification of the needs of all the potential users of the system
- performance of its existing hardware and software
- mechanisms it has to support the development, delivery and implementation of all aspects of the IT resource, including the structure and profile of its current staff
- how it allocates its IT resource, whether it be through centralised means, or partially or fully distributed means
- role and effectiveness of the IT user group (if established)
- IT training available in terms of how appropriately it equips staff at all levels to use the system and interpret the information obtained from it

The above needs analysis must be allocated sufficient time and resource if it is to be carried out effectively — it is not something which can be achieved in a few days as an additional responsibility for an individual. It may be more effectively executed if a senior manager, with a clear understanding of what is required and a grasp of information technology, undertakes all but the more technical aspects of the work.

A college with limited in-house expertise should explore the benefits of using consultants. However, it is essential that any consultants commissioned understand the educational context of the system. When this is the case, consultants can be invaluable in analysing the effectiveness and real usage of current systems to ensure an appropriate strategy is developed. Temporary technical expertise can also be useful for sizing up hardware requirements and implementing any necessary upgrades of hardware and software.

A needs analysis will not provide a set of solutions, but will define the nature of the problem. Before an information strategy can be developed it will be necessary to establish in greater detail the user requirements, in terms of the management of the learning process.

Practical steps

To develop a total information strategy, the information needs within the curriculum and those for administration and decision-making must be considered concurrently. It is essential to involve users at all levels across the college so that together you can find the solution which is suitable for all.

There is no right way to develop a strategy. The number of steps required and in what order will depend upon the results of your needs analysis and the strategic requirements of your college. What is essential is that each step is defined within a clear structure and with specific outcomes. While it is not possible to set out all the steps required by your college, the following are some of the main steps that you may need to consider when developing a strategy.

Assign a development leader

Identify a senior manager to lead the strategy development and implementation — this should not be a short-term appointment to solve one particular problem.

The development leader needs to have a clear view of what is needed to manage the learning process, and an awareness, rather than detailed knowledge, of the available technologies.

He or she must have credibility in both curriculum and college service functions in order to find solutions which integrate the whole of the information service.

Set up a strategy group

The role of the strategy group will be to oversee the development of the information strategy and, in particular, to specify all of the user requirements and functions of which the system should be capable. Members of this group should include managers, lecturers and administrators.

When obtaining this information the group should involve all who will use and benefit from the production of quality information, including Board members and students.

Analyse your users' requirements

Analysis of user requirements will take some time to achieve.

Many staff do not know what information they require to manage the learning process or other aspects of their work more effectively. It may therefore be helpful to spend time talking to staff and students in small groups and seminars in order to acquire a detailed view of actual and potential requirements of the users.

While every college will have specific interests or activities which it will need to define for itself to establish an effective total able to adapt these as necessary to fit their specific needs.

Create an initial user specification

Once you have analysed the user requirement, as defined above, you will be ready to develop an initial user specification. This step has to be carefully executed. It will form the basis of the planning, development and future functionality of the information strategy and hence, system.

While it is impossible to predict every requirement which may arise, there will be certain requirements which are obvious from the outset. When deciding what to include, bear in mind that:

- some user requirements may be better achieved through non-computerised means, especially in the early days of implementation and providing that integration, interfacing or functionality is not significantly reduced
- you will need to identify which aspects of the total specification are essential and need to be implemented immediately and which may only be 'icing on the cake'; remember that the 80:20 rule will apply, that is, 80 per cent of user requirement will probably take only 20 per cent of the total development effort!
- you will need to define some standard reports which the system is able to generate when first up and running, and so will also need to ensure that the system has an easy-to-use end-users report writer/enquiry tool which allows the selection of any stored data fields in any combination for either on-screen enquiries or printed reports

Decide on the system functions

When deciding what functions the system will need to perform, the strategy group needs to consider all information needs relating to:

- the college curriculum offer
- providing customer information on the curriculum offer
- enrolment and registration requirements specific to the college
- production of data on the different funding units
- production of both standard and specific reports

System design and development should then be left to the experts (for example, a systems analyst working with a software supplier or in-house development team). Their role is to ensure that the software supplied can be used to manipulate data according to college (primary) and external (ancillary) requirements.

Identify curriculum IT needs

Establish a curriculum working group to assess what IT provision is required for each curriculum subject area. This group can then seek to maximise the opportunities for student access and ensure efficient use of

resources across the college. It should also take on board the recommendations given by the Higginson report to ensure that information and learning technology opportunities are not missed.

Analyse your communication systems

Consider the relationship between information flows and your communication systems. Communication within colleges is often cited as a problem at all levels. Where IT networks are inadequate, immediate benefits can be realised by, for example, linking workgroup PCs to facilitate the electronic transfer of information. Using laptops, rather than fixed terminals, for key user groups can allow the resource to be distributed to where it is required at a given time. Investment in, and planned implementation of, a college-wide telecommunications and IT infrastructure will provide channels for collection, sharing and dissemination of information, as well as delivery of IT services to support curriculum delivery (for example, video conference facilities).

Identify hardware requirements

Where investment in new software is planned, hardware may need to be replaced or upgraded.

If you do not have the expertise in-house, it may be helpful to employ external consultants to advise on your hardware requirements.

If you do use consultants make sure they are qualified, come recommended and have experience in the education sector. Agree clear terms of reference in advance of consultancy days. If they are not independent, for example, if attached to the system's suppliers, be aware of the possibility of bias or self-interest.

The timing of any upgrading requires careful planning to minimise disruption to users. Contingency plans should include the ability to revert to the original configuration in case of problems with assimilating the upgrade.

Decide on your training needs

Training and staff development needs should form a key part of your strategy development. Identify both immediate and long-term needs.

Training for the majority of staff should emphasise system awareness and information interpretation. Training in programming and complex manipulation of technical data will only be necessary for small numbers of technical staff. The timing of training is essential — it must be provided at a time when the system is accessible and functional and contains realistic if not real-time data. Some colleges are beginning to introduce elements of NVQs in IT for all staff as a framework for data handling and/or management.

Set up IT development groups

A software development group and a hardware development group are needed to:

- determine the policy for identifying the curriculum and management requirements for software development
- control implementation and licensing throughout the college
- make purchasing recommendations
- review the required functionality of the system from time to time
- make recommendations for phased development and implementation of upgrades

Both of these groups must include a range of representative users from across the college and not just those who are IT specialists.

Create a resourcing strategy

Strategic decisions need to be made about the level of resource required, and where these resources should be sourced. Problems with implementing the information strategy are often not due to a

lack of finance or staff but rather the ineffective use of these resources. Defining accurately what resources are required may be the most crucial aspect of achieving successful implementation of the information strategy.

The college may hope that the introduction of IT systems will allow some resources, including staffing, to be reduced. However, during the early stages of implementation staff reductions are not recommended and it may be that additional resourcing is required.

Re-launch the College Information Service

Renaming and re-launching the college information service (CIS) can often do much to give it a new lease of life, especially if it is accompanied by the launch of an internal helpline for users. It may also be helpful to establish a service level agreement, agreed upon between CIS and user departments.

Set up a user group

Establish a user group which includes representatives from all sectors of users, including students.

Over a short period of time, this group will take over the role of the strategy group. It should be facilitated by a senior manager, but not the same individual who is leading the strategy, as its role is to inform strategic development and implementation of that information strategy.

Strategy development

While it is not possible to provide a blueprint for a total information strategy for colleges — since each college is working towards an individual strategic plan and has its own specific information needs — it is possible to suggest the areas which the strategy may need to cover. These are:

- strategic priorities for the management of the learning process, which can be defined at a:
  - — macro-level, in terms of the college as a whole and related to the strategic plan
  - — meso-level, in terms of the student, financial, curriculum information required
  - — at a micro-level, by defined unit such as cost centre, teaching or service section, and at an individual level
- user requirements — derived from the strategic priorities, including an indication of what information will be required by groups of users across the college
- an implementation plan — defining the targets to be achieved by given dates either by specified individuals or by groups
- an operational plan — defining the steps and stages required to effect the implementation
- quality standards — in terms of the nature of the information required, its availability and timeliness and the support given within the college
- critical success factors — by which the performance of the information service can be measured
- resourcing — in terms of capital and revenue finance, staff and time. This may require imaginative approaches such as top-slicing of budgets over time to achieve:
  - — management of the strategy, to ensure both its implementation and effectiveness
  - — monitoring and evaluation, which outlines the process required for systematic evaluation of all aspects of the strategy as part of the college's normal quality processes

Implementation plan

For the overall strategy to be a success, the implementation plan for introducing new information systems will need to pay attention to the following key elements:

- the structure of the information system in terms of its definitions of functionality, integration and interfaces and so on

- how to provide effective user access to the system, including the use of centralised and decentralised facilities, fixed and portable terminals/computers
- ownership of the information and the system and its development from the point of view of the users
- training for all the users at every level as well as of the operators
- structure and user-friendliness of the college information service, including the level and availability of technical and technician support

If the system is well developed, there will be no need to define separately internal and external requirements.

A critical test of the effectiveness of your system will be that the management of the learning process is improved across the college, with a demonstrable benefit to the learners.

An ancillary test of proper development and implementation will be that the institution can provide information for external agencies and for internal purposes as a matter of course, rather than as a response to specific requests.

Conclusions

This paper has identified a number of strategic and practical considerations which colleges may wish to think about in developing and implementing a total information and information systems strategy. It has not attempted to provide an instant solution, since each institution needs to establish a clear process and strategy specific to its strategic plan and user needs.

Once the strategy has been developed, there are a number of guiding principles on which a college will need to stand firm to ensure successful implementation:

- lead from the top, but involve managers, teachers, administrators and students with the development of the strategy — do not leave solutions to the technocrat without making reference to the management of the learning process
- do not attempt to do too much at once — the priorities and targets must be realistic
- spend enough time in the early stages of development of your strategy to identify effectively the needs of your institution — do not attempt to apply a strategy which has been devised for another institution
- carry out thorough research before spending and do not be tempted to ditch the current hardware and software until you are convinced there is no other solution — with the disruption this can cause, you need to be certain that the new technology will be more effective than the old
- do not become diverted away from your overall strategy by secondary issues or immediate demands
- do ensure that you measure the effectiveness of the strategy at each stage of its development and implementation; a measure of success should be an improvement in the students' experiences

There is no panacea to the effective development of effective information systems. However, a clear information strategy which is consistent with the strategic direction of the college, and resourced effectively, will go a long way to provide the framework needed for the management of the learning process.

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